Terrorist Attack - Environmental Implications

World Trade Center and Pentagon Disasters *AMEC's Response*

The aftermath

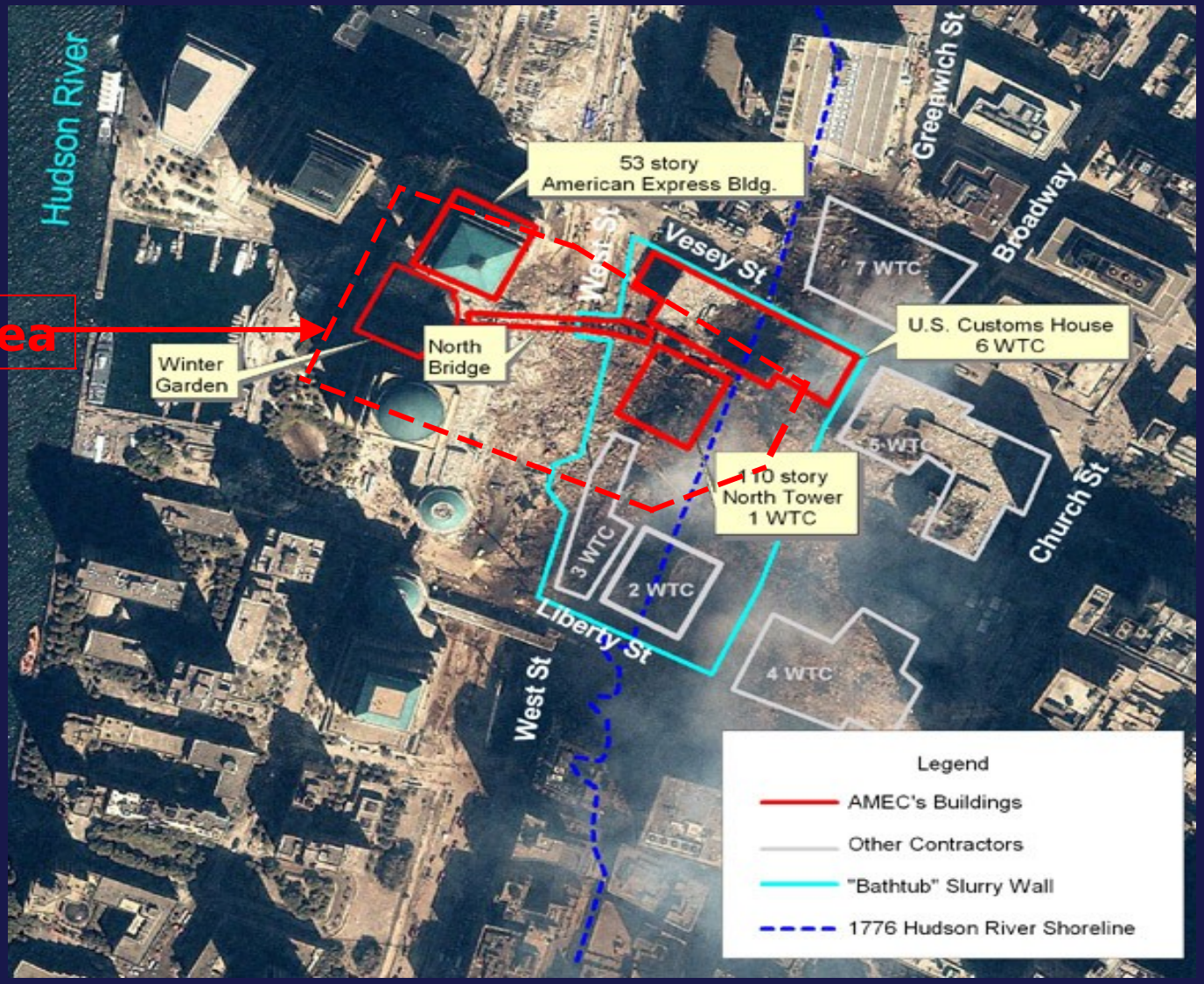
World Trade Center

- Collapse of eight buildings, including two 110-story towers
- At time, more than 5,000 people believed dead or missing

The Pentagon

- Damage to Wedge One and extensive damage to Wedge Two
- At time, more than 200 people believed dead or missing

AMEC's Northwest Quadrant



AMEC Sector World Trade Center

Safety Health & Environment (SHE) Plan Development

Step No. 1

Site Visit

- Assess the Scene (Assume nothing)

Goals

- Observe Actual Conditions
- Establish Lines of Communication
- Start Response Action

North Bridge at West Street

AMEC Quadrant - Twin Tower 1

West & Liberty Streets

West Street looking Northeast

SHE Plan Development

Step No. 2

Develop an Initial Plan of Attack to Establish:

- Personnel sign in / sign out procedures
- Evacuation procedures
- Initial PPE requirements
- Monitoring / sampling program(s)

Site Control & Characterization

- Establish Site Control
- Develop an Initial Site Characterization

Site Control

- Set up a base of operations & facilities (Safety Office)
- Establish sign-in / sign out procedures to track employees

Site Control

- Provide site orientation
- Provide appropriate PPE
- Train all people on site

Site Control / Characterization

AMEC Command Center 24 / 7 Operations

- Track Employees and shipments of equipment and materials
- Disseminate information openly with all personnel

Site Characterization

Sampling

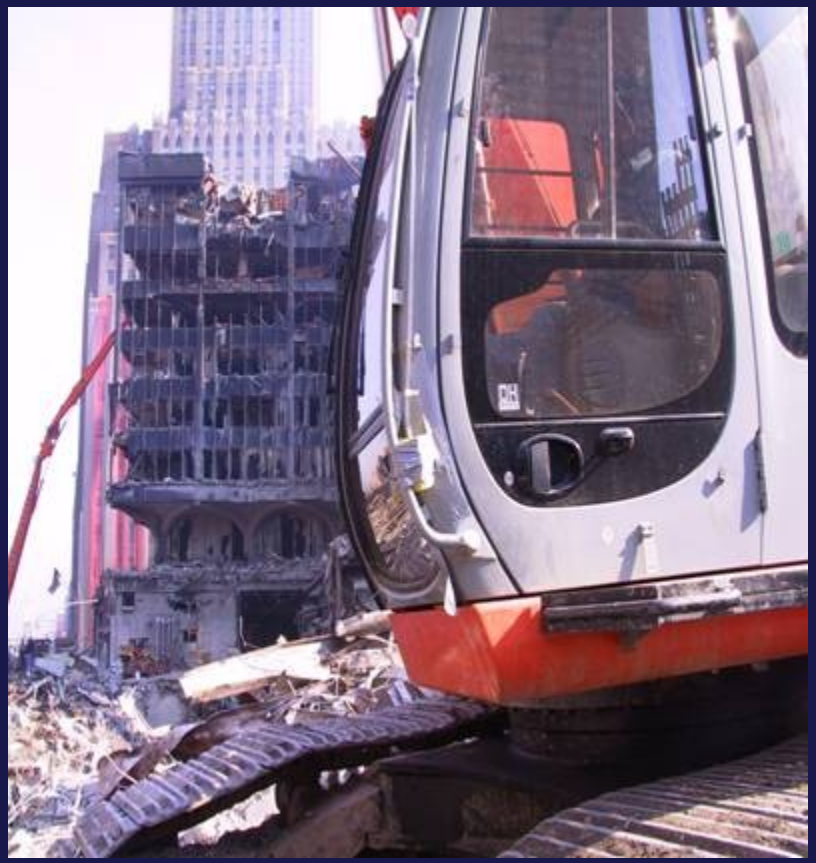
- Collected data to determine hazards
- Collected additional data to verify information received from others

Site Characterization

Sampling

- Sampled in real time
- Worked with agencies when possible

Site Characterization



- Sample equipment both mobile and fixed

Site Characterization

- Personnel monitoring and discrete work area samples representative of all activities

Contaminants of Concern

- Asbestos
- Carbon Monoxide
- Respirable Silica
- Dust
- VOCs
- Inorganic Acids
- Oxides of Nitrogen/Sulfur
- PCBs
- Bloodborne Pathogens
- Metals (including Lead)
- Mercury
- Ionizing Radiation
- Dioxins
- PAHs
- Freon, Hydrogen Fluoride & Phosgene
- Noise

Within Tower 1 - Oct 4

SHE Plan Development

Step No. 3

Determine the Basis of Site Operations

Rescue & Recovery Operations

- Removal of human remains
- Excavation and transportation of materials
  - ✓Demolition debris
  - ✓Structural steel
  - ✓Hazardous materials
  - ✓Non-hazardous materials

Site Operations

Rescue – Emergency Personnel

- FDNY
- NYPD
- PAPD
- Other emergency service agencies

Rescue Operations

SHE Plan Development

Step No. 4 Review the Issues at the Site:

- General Safety Concerns
  - Slip, Trip, Falls
  - Decontamination
  - Sanitation
  - Illumination
- Task-Specific Concerns
  - Crane Operations
  - Heavy Equipment Operations
  - Marine Operations
- Other Site Related Concerns
  - Dust & Debris Control
  - Freon Release / Recovery
  - Fire Suppression
  - Material Handling & Storage
  - Asbestos Containing Materials
  - Weather Conditions

Crane Operations

- Inspections
- Man Baskets
- Rigging
- Lifts
- Demolition

Crane Operations

Lifts

- Establish proper lift procedures

Crane Operations

Man Baskets

- Establish proper man-basket procedures
- Continually upgrade practices & procedures

Heavy Equipment Operations

Grappler / Excavator

- Equipment operating in close proximity to each other

Heavy Equipment Operations

- Night operations

Heavy Equipment Operations

- Installed supplied air breathing systems on equipment working in pile

Heavy Equipment Operations

- Installed tie backs to support slurry wall as excavation progressed

Marine Operations

- Ocean going barges and tug boats required to move large volumes of debris and structural steel removed from site

Site Safety Issues

Dangerous work environments

- Broken Glass

Site Safety Issues

Broken glass

- Netting
- Sidewalk sheds
- Barricades

Site Safety Issues

Freon Recovery

- Part of Freon Monitoring Development Team
- WTC contained world's largest refrigerant plant

Site Safety Issues

Dust and Debris Control

- Fire & Dust Suppression

Site Safety Issues

- Cut and Burn Stations with debris netting on out going loads

The Pentagon

Pre-September 11th

- AMEC's Construction Management division just completed $258 million refurbishment of Wedge 1 - five story, 1.2 million sq. ft. section of Pentagon, including building strengthening measures:
  - innovative steel reinforcing system installed along historical exterior wall
  - steel crossbeams framed windows
  - blast-resistant, two-inch thick glass on external windows
  - reinforcing fabric (inboard wall surfaces) to catch any fragmented wall materials - to protect from potential blast

Exterior Building Damage

- September 15, 2001
- Building collapsed 2 hours after fire.
- Stood due to blast protection. (kevlar, steel, composite window)
- Most occupants survived.

View Across Collapse

Demolition in Progress

- Demolition Between Corridors 4 and 5
- Asbestos Abatement Inside Wedge 2 Areas (200,000 SF in 30 Days)
- Removing Historic Building Stone
- Proper Health and Safety Controls and Support

Interior Repairs

- Extensive Water Damage and Mold
- Established Mold Abatement Procedures
- Assessed Damage and Marked Areas for Selective Demolition and Repair
- Managed Demolition Subcontractor

Selective Demolition

- Selectively removed drywall, all carpet, furniture and ceiling.
- HEPA vacuum and treated surfaces with biocide.
- Dehumidified building and HEPA filtered air to control dust and mold.

ABATED OFFICE AREA

Cleaning Above Ceiling

Restored Corridor

amec